CHM 113 General Chemistry I

Key

Balancing Equations & Stoichiometry

1) Balance the following equations:

*Hint: balance C & H 1st

a) 2 C_2H_6 (g) + 7 O_2 (g) → 4 CO_2 (g) + 6 H_2O (g)

*Hint: balance P 1st

b) P_4O_6 (s) + 6 H_2O (l) → 4 H_3PO_3 (l)

*Hint: balance O 1st

c) 4 $KClO_3$ (s) → KCl (s) + 3 $KClO_4$ (s)

2) How many grams of C_3H_3N are obtained from 651 kg of C_3H_6 and excess NO given the following equation:

molar mass = 3(12.0107 g/mol) + 3(1.00794 g/mol) + 1(14.00 g/mol) = 53.0559 g/mol

4 C_3H_6 (g) + 6 NO (g) → 4 C_3H_3N (g) + 6 H_2O (g) + N_2 (g)

Know

651 kg

excess

want: ↑ in grams

mw = 3(C) + 6(H)
= 3(12.0107 amu) + 6(1.00794 amu)
= 42.0797 amu
= 42.0797 g/mol

$$651\ \text{kg}\ C_3H_6 \times \frac{1000\ \text{g}}{1\ \text{kg}} \times \frac{1\ \text{mol}\ C_3H_6}{42.0797\ \text{g}\ C_3H_6} \times \frac{4\ \text{mol}\ C_3H_3N}{4\ \text{mol}\ C_3H_6} \times \frac{53.0559\ \text{g}\ C_3H_3N}{1\ \text{mol}\ C_3H_3N} = 8.20 \times 10^5\ \text{g}\ C_3H_3N$$

3) How many grams of tungsten can be obtained from 4.81 kg of hydrogen with excess tungsten (VI) oxide?

WO_3 (s) + 3 H_2 (g) → W (s) + 3 H_2O (g)

excess

4.81 kg

want: ↑ in grams

molar mass: 2(H) = 2(1.00794 g/mol)

molar mass: 183.84 g/mol

2.01588 g/mol

$$4.81\ \text{kg}\ H_2 \times \frac{1000\ \text{g}}{1\ \text{kg}} \times \frac{1\ \text{mol}\ H_2}{2.01588\ \text{g}\ H_2} \times \frac{1\ \text{mol W}}{3\ \text{mol}\ H_2} \times \frac{183.84\ \text{g W}}{1\ \text{mol W}} = 1.46 \times 10^5\ \text{g W}$$

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Ions – charges, particles and naming Practice Problems

1) Complete the table

mass# = #protons + #neutrons
atomic # (from P.T.)
mass# − # protons

$^{A}_{Z}X$	Number of electrons	Number of protons	Number of neutrons	charge
$^{31}P^{3-}$	For neutral 15 but gained 3 so 18	from P.T. 15	31−15 = 16	3^-
$^{79}_{34}Se^{2-}$	For neutral 34 but gained 2 so 36	34	45	2-
$^{119}_{50}Sn$	Neutral = 50 46	50	69	Lost 4 e⊖s ∴ 4+
$^{197}_{79}Au^{3+}$	76 ← rather losing 3e⁻s	79	118	3+

79 for neutral ∴

2) Give the name for the following

a) CuS — copper (II) sulfide (Cu 2+, S 2-) — b/c transition metal

b) Ag_2SO_4 — silver (I) sulfate — 2 Ag^{1+} 1 SO_4^{2-} — transition metal, polyatomic

c) $KClO_4$ — potassium perchlorate — K^+ ClO_4^-

d) $K_2Cr_2O_7$ — potassium dichromate — 2 K^+ $Cr_2O_7^{2-}$ — polyatomic

Provide the formula for the following:

a) aluminum hydroxide — Al (3+), OH (⊖), polyatomic — $Al(OH)_3$

b) sodium phosphate — Na (+), PO_4 (3−), polyatomic — Na_3PO_4

c) iron (III) carbonate — Fe (3+), CO_3 (2−), polyatomic — $Fe_2(CO_3)_3$

e) sodium hypobromite — Na^+ OBr^- — NaOBr